

Before the  
Federal Communications Commission  
Washington, D.C. 20554

ET Docket No. 93-40

In the Matter of

Allocation of the  
219-220 MHz Band for Use by  
the Amateur Radio Service

RM-7747

**REPORT AND ORDER**

Adopted: March 14, 1995;

Released: March 17, 1995

By the Commission:

**I. INTRODUCTION**

1. By this action, the Commission allocates the 219-220 MHz band to the amateur radio service on a secondary basis for point-to-point fixed digital message forwarding systems,<sup>1</sup> including intercity packet backbone networks. This allocation will alleviate congestion that amateurs are experiencing in certain areas of the country in the 222-225 MHz band and will facilitate establishment of regional and nationwide networks for amateur digital packet communications. The regulatory plan we are adopting will also ensure that use of this band by amateurs does not interfere with other users of this and adjacent bands.

**II. BACKGROUND**

2. This proceeding was initiated in response to a Petition for Rule Making (RM-7747) filed by the American Radio Relay League (ARRL). In its petition, ARRL requested that the Commission permit secondary amateur use of the 216-220 MHz band for wideband digital packet backbone networks. ARRL stated that this allocation was needed to

alleviate congestion in the 222-225 MHz band and to permit the development of new regional and nationwide packet networks.

3. The 216-218 and 219-220 MHz bands currently are allocated on a primary basis to the maritime mobile service for Automated Maritime Telecommunications Systems (AMTS).<sup>2</sup> The 218-219 MHz band is allocated on a primary basis to Interactive Video and Data Services (IVDS).<sup>3</sup> In addition, frequencies within the 216-220 MHz band are allocated on a secondary basis to wildlife telemetry,<sup>4</sup> fixed and land mobile services, and aeronautical mobile services.<sup>5</sup> Television broadcast channel 13 operations occupy the adjacent 210-216 MHz band.

4. Packet radio systems transmit digital data in groups or "packets" using a specified format. Radio channels used by these systems are occupied only during the time individual "packets" of data are actually being transmitted. Upon completion of a transmission the channel becomes available for other traffic. Amateurs use packet radio for transmitting a variety of material, including messages, computer programs, graphic images and data bases. These systems can be used in times of emergency to efficiently carry a large volume of messages when other communications facilities are out-of-service or overloaded. Amateur radio operators use special wideband packet radio networks to provide intercity links for their packet radio systems. Amateurs are permitted to send data, radio teletype, and analog signals, including all types of packet communications in the 222-225 MHz band. The packet message forwarding systems are point-to-point fixed systems and are permitted in the 222-225 MHz band and on higher frequency bands.

5. On February 26, 1993, a *Notice of Proposed Rule Making (Notice)* was adopted in this proceeding. In the *Notice*, we tentatively concluded that there is a need for some additional spectrum for wideband digital packet backbone networks.<sup>6</sup> However, we were also concerned that amateur use of the 216-219 MHz portion of this band could result in harmful interference to primary services on and adjacent to those frequencies. Therefore, we proposed to allocate the 219-220 MHz band for secondary amateur use, and we proposed rules to prevent such amateur operations from interfering with the existing primary services.<sup>7</sup> Twenty-one parties submitted eighteen comments and five replies in response to the *Notice*.<sup>8</sup>

<sup>1</sup> In the *Notice of Proposed Rule Making (Notice)*, we proposed to use the 219-220 MHz spectrum for amateur auxiliary station (point-to-point) packet backbone networks and other amateur point-to-point fixed communications. At the time of the *Notice*, the operation of such networks fell within the scope of operations covered by the definition for auxiliary stations. Last year, in order to clarify the meaning of the term "message forwarding system" we added a definition of this term in Section 97.3 of the Rules. The operation of intercity packet networks falls within the definition for "message forwarding systems." See *Report and Order*, PR Docket No. 93-85, 9 FCC Rcd 1786 (1994). We are using this new definition herein.

<sup>2</sup> AMTS has a primary allocation in the 216-218 MHz and 219-220 MHz bands with AMTS group A and B coast stations at 217-218 MHz and AMTS group A and B ship stations at 219-220 MHz. Group C and D coast station frequencies in the 216-217 MHz band are currently not assignable. See 47 C.F.R. §§ 2.106, 80.385(a)(2).

<sup>3</sup> See 47 C.F.R. §§ 2.106, 95.801 *et seq.*

<sup>4</sup> This secondary allocation authorizes tracking of, and telemetering of scientific data from, ocean buoys and wildlife.

<sup>5</sup> Radiolocation was reduced to secondary status as of January 1, 1990, see International Footnote 627 to the Table of Frequency Allocations, 47 C.F.R. § 2.106. Additionally, note US229 states that stations in the fixed and mobile services are prohibited from causing interference to the U.S. Navy's SPASUR system.

<sup>6</sup> See *Notice of Proposed Rule Making*, ET Docket No. 93-40, 8 FCC Rcd 2352 (1993).

<sup>7</sup> At the time of the *Notice*, ProNet, Inc. (ProNet) had petitioned the Commission for a secondary allocation for electronic tracking services in the 216-220 MHz band. Subsequently, ProNet modified its petition to request an allocation in the 216-217 MHz band. The Commission is considering whether to reallocate 216-217 MHz band in PR Docket No. 92-257.

<sup>8</sup> Appendix C lists the commenting parties.

### III. DISCUSSION

6. Historically, the amateur service has contributed to the development of radio technology and fulfilled important communications requirements during times of emergency. We believe it is important to assist and encourage amateur radio operators in continuing these efforts. As discussed below, we therefore are allocating, on a secondary basis, the 219-220 MHz band for point-to-point fixed digital message forwarding systems.<sup>9</sup> This additional spectrum for amateur operations will serve the public interest by: 1) relieving congestion that exists in the 222-225 MHz band in certain geographic areas; 2) encouraging the development and implementation of a regional and/or nationwide digital message forwarding system network that can be used for emergency and national defense communications purposes; 3) facilitating connection of local packet nodes to form such regional and nationwide networks; and, 4) providing spectrum for exploration of new technology related to these purposes.

#### Spectrum Allocation.

7. In the *Notice*, we observed that the 222-225 MHz amateur band appears to be significantly congested in certain areas, and that this congestion appears to limit the ability of the amateur community to interconnect existing amateur packet networks. We therefore proposed to allocate the 219-220 MHz band on a secondary basis for amateur auxiliary station packet backbone networks and other amateur point-to-point fixed communications. We also proposed rules to prevent amateur operations from causing interference to primary operations in and adjacent to this band. We sought comment on whether amateur use of this band should be limited to digital data communications or to any digital communications, including digitized voice, or whether any modulation or access method should be permitted so long as the operation is for point-to-point fixed communications.

8. *Comments.* The majority of the commenting parties support our initial assessment of the need to allocate additional spectrum for the amateur services. Most of these parties agree that the 219-220 MHz band can be used for development of amateur point-to-point fixed digital message forwarding systems without obstructing the operation of existing services.<sup>10</sup> For example, ARRL states that the *Notice* represents a reasonable attempt to alleviate the frequency congestion in the 222-225 MHz amateur band.<sup>11</sup> Waterway Communications System, Inc. (Watercom), an AMTS provider, supports the allocation provided that the priority status of the primary AMTS service is recognized and appropriate standards are adopted to prevent interference problems.<sup>12</sup> ProNet submits that this allocation will

provide necessary public safety and emergency services.<sup>13</sup> The Valley Emergency Radio Association (VERA) concurs that the proposed allocation and rules recognize immediate needs and will provide a workable environment for both current and future requirements.<sup>14</sup> The National Communications System (NCS), the Oregon Region Relay Council (ORRC), and other commenters agree with our assessment that secondary status is a reasonable means of protecting primary users in the band.<sup>15</sup> Additionally, the Association for Maximum Service Television (MSTV) supports our decision not to allocate the 216-218 MHz band in order to protect television operations and our plan to adopt rules to minimize interference.<sup>16</sup> Lee Sutherland Parr (Parr) supports the allocation, but contends that the best way to protect other services from amateur operations would be to allocate the entire 216-220 MHz band to the amateur service, thereby permitting amateurs more flexibility in the selection of frequencies in order to avoid conflicting operations.<sup>17</sup>

9. A number of parties raise concerns that amateur operations at 219-220 MHz could cause interference to other services. George DuBois (DuBois), Orion Telecom (Orion), and Paging Systems, Inc. (Paging Systems) argue that while they are sympathetic to the amateur request, an amateur allocation at 219-220 MHz would affect adversely the primary AMTS operations in this band.<sup>18</sup> DuBois contends that amateur use of the 219-220 MHz band would be precluded in many areas because of expanding AMTS operations. Alternatively, DuBois recommends that amateurs share the 225-226 MHz government band.<sup>19</sup> Orion similarly states that there are few places where an amateur system could operate without causing interference.<sup>20</sup>

10. Regarding the modulation method to be permitted in the 219-220 MHz band, ARRL and Mike Cheponis (Cheponis) state that digital communications that otherwise comply with the technical rules should be permitted, but that other modulation techniques, such as analog voice, should not be used because they have different interference characteristics.<sup>21</sup> VERA asserts that alternative transmission modes, such as spread spectrum, may be appropriate in the future because amateurs will want to experiment with many forms of digital communications.<sup>22</sup> Roy Gould (Gould) requests that only efficient packet signals using time shared random access be allowed, arguing that permitting old-fashioned radio teletype transmissions on a wideband channel would waste spectrum.<sup>23</sup> Oregon Packet Experimenters Network (OPEN), Mitchell, and other parties state that restricting the modulation method to digital techniques as a method for reducing the potential for interference is not warranted.<sup>24</sup> OPEN argues that the spectrum characteristics of digital and analog modulation types

<sup>9</sup> This allocation is available for point-to-point intercity links to connect local packet network hubs, forming the backbone for regional or nationwide networks. It is not permitted to be used for local packet networks (which operate on a point-to-multipoint basis) or for mobile uses.

<sup>10</sup> Gary R. Mitchell (Mitchell) requests that the 220-222 MHz band be returned to the amateur service. This request is beyond the scope of this proceeding.

<sup>11</sup> ARRL Comments at 3.

<sup>12</sup> Watercom Comments at 2-4.

<sup>13</sup> ProNet Comments at 1.

<sup>14</sup> VERA Comments at 2.

<sup>15</sup> NCS Comments at 2 and ORRC Comments at 2.

<sup>16</sup> MSTV Reply at 1.

<sup>17</sup> Parr Comments at 1-2.

<sup>18</sup> DuBois Comments at 1-2; Orion Comments at 3-8; and Paging Systems Reply at 1-3.

<sup>19</sup> DuBois Comments at 2.

<sup>20</sup> Orion Comments at 7.

<sup>21</sup> ARRL Comments at 7 and Cheponis Comments at 2.

<sup>22</sup> VERA Comments at 3, 5.

<sup>23</sup> Gould Comments at 2.

<sup>24</sup> OPEN Comments at 2, Mitchell Comments at 1.

are virtually identical with regard to interference potential and that restrictions differentiating between the two are therefore not warranted.

11. *Decision.* We continue to believe that there is a need for a limited amount of additional spectrum in the 220 MHz range for amateur point-to-point fixed digital message forwarding systems. We find that a secondary allocation for the amateur service in the 219-220 MHz band can meet these needs and provide needed spectrum relief for certain amateur requirements including the development of wideband intercity packet networks. In this regard, we are encouraged by ARRL's plan to organize a high-speed, nationwide digital communications network that would use the 219-220 MHz band where available, and other connections where it is not.<sup>25</sup>

12. We also find that amateur operations can utilize the 219-220 MHz segment on a secondary basis without causing interference to other services if their operations are properly engineered and appropriate regulatory safeguards are applied. Specifically, we conclude that amateur services can share spectrum with the primary AMTS. Contrary to Orion's assertion, we believe that with careful attention to frequency and distance separation, amateur stations will be able to share this band with AMTS ship stations. In this regard to ensure that interference is not caused to AMTS operations, we are adopting rules that prevent amateur 219-220 MHz operations within 80 kilometers (km) of AMTS stations without the AMTS licensees' approval and that require that AMTS licensees be notified of all amateur 219-220 MHz operations within 640 km. We believe that by using directional antennas, frequency separation, cross polarizations of signals, and other interference avoidance techniques, amateurs will be able to establish interference free operations. We note that Watercom, the principal AMTS provider, supports the allocation and concurs with most of these conditions of operation for the amateur service. Contrary to Utilities Telecommunications Council's (UTC) concerns, we continue to believe that amateurs will maintain the integrity of their operations and enforce sound engineering practices. We note that the amateur service has a long history of successfully sharing with other users. We also note that the secondary status of the allocation and the technical and operational guidelines we are adopting herein will serve to protect primary services on adjacent frequencies, such as TV channel 13 and land mobile operations at 220-222 MHz. Finally, we do not find that the other spectrum alternatives suggested by the commenters are viable. Specifically, the 225-226 MHz band is utilized by the United States Government and is not available for amateur use at this time. The 220-222 MHz band is being licensed to narrowband private land mobile operations and we anticipate heavy use of this spectrum.

13. With regard to the type of modulation to be authorized in this band, we agree with ARRL and Cheponis that all digital communications that comply with our technical standards should be permitted. We disagree with those parties who advocate permitting analog communications. The record in this proceeding clearly emphasize that this additional spectrum is needed by the amateurs specifi-

cally to construct a nationwide point-to-point fixed digital message forwarding system. Given the interference safeguards we are adopting, not all of the channels will be available in all areas. Restricting use of this spectrum to digital message forwarding systems will help ensure that this one megahertz is used efficiently and is sufficient for the operations which justify its allocation.

14. Accordingly, we are allocating the 219-220 MHz band to the amateur service on a secondary basis for point-to-point fixed digital message forwarding systems. This allocation will foster technological experimentation and innovation, particularly with higher data rates, and will facilitate the construction of regional and/or nationwide packet data backbone networks that can be used for emergency communications purposes. This allocation will provide for increased access to communications services for amateurs and will also relieve the congestion that exists in the 222-225 MHz band in certain geographic areas. The amateurs' ability to perform interference analyses, the directional nature of point-to-point communications, the technical rules we are adopting to govern amateur use of this band, and the secondary status of this allocation will adequately protect all primary and existing secondary operations in and adjacent to the 219-220 MHz band.

#### IV. OPERATIONAL ISSUES

15. In allocating the 219-220 MHz band for amateur use, we seek to provide amateurs with the maximum operational flexibility possible. Operation of amateur services in the 219-220 MHz band on a secondary basis, however, will necessitate careful attention to the potential for interference to primary services and to other secondary services. The rules adopted below are intended to balance our desire to provide flexibility for amateur operations and the need to ensure that such operations do not cause interference to other services.

##### Technical Standards.

16. In the *Notice*, we proposed that amateur stations in the 219-220 MHz band be permitted to operate with up to 25 watts Peak Envelope Power (PEP) output for the Novice class and 50 watts PEP for all other classes.<sup>26</sup> We indicated that these proposed power limits would allow amateurs to operate effective packet networks while protecting other operations in and near the frequencies being used. Additionally, we requested comment on whether amateur operations in the 219-220 MHz band should be restricted to Technician or higher class amateur licensees. We also requested comment on whether amateur operations in the 219-220 MHz band should be limited to a maximum transmission rate of 56 kilobauds and a maximum bandwidth of 100 kilohertz as specified in Section 97.307(f) of the Commission's Rules.<sup>27</sup>

17. *Comments.* ARRL submits that the 50 watt power limit is appropriate and should prevent harmful interference to other occupants of the band. ARRL also states that most stations operating data communications will use considerably less power than 50 watts.<sup>28</sup> Cheponis suggests that

<sup>25</sup> See *Moved & Seconded*, QST, at 86, January, 1994. We note that the ARRL has completed action on its 219-220 MHz band plan, see *Moved and Seconded*, QST, at 91-92, March, 1995.

<sup>26</sup> See *Notice* at 9, *supra*.

<sup>27</sup> See 47 C.F.R. § 97.307(f).

<sup>28</sup> ARRL Comments at 5.

power limits should be set on a spectral density basis and that the limit be 1 milliwatt per hertz.<sup>29</sup> Orion states that amateurs using 25 watts or 50 watts within 50 miles of an AMTS station would devastate the AMTS operations and suggests that a desired signal to undesired signal (D/U) ratio be used to regulate interference instead of power limits and notification requirements.<sup>30</sup>

18. ARRL recommends that only licensees holding Technician or higher class licenses be permitted to use the 219-220 MHz segment because of the level of knowledge and analysis that is required to initiate these types of operations in this band. However, VERA argues that this is not a significant difference between the amateur Novice and Technician licensees and recommends that Novices be permitted to operate in this band without special power limitations established for that class of license.<sup>31</sup>

19. Mitchell, ARRL, Dwayne Hendricks, and others oppose data rate limits and state that bandwidth limitations along with the usual out-of-band radiation specifications are adequate to prevent interference. ARRL states that the appropriate means of limiting interference potential is through specification of bandwidth, rather than limiting the data rate.<sup>32</sup> VERA recommends that the maximum bandwidth be specified as a function of the distance of the center carrier from the band edge.<sup>33</sup> Gould recommends 250 kilohertz channels with no data rate limits, arguing that there is no reason to limit the use of different technologies with an arbitrary baud limit.<sup>34</sup> Watercom opposes any increase in the 100 kilohertz channel bandwidth, stating that an increase in bandwidth would cause an increase in interference problems.<sup>35</sup>

20. *Decision.* While specifying an output power limit by its spectral density may be appropriate, given the wideband characteristic of digital operations<sup>36</sup> amateur service rules are designed to accommodate many different types of operating activities and power traditionally has been defined in terms of peak envelope power for all types of transmission. We do not believe it necessary to complicate the amateur rules by changing the manner in which power is specified in this band. Similarly, the nature of the amateur rules militates against use of D/U ratios. Use of D/U ratios would be unnecessarily complicated because measurements of the signals would be necessary at every primary service licensee's station.<sup>37</sup> We agree with ARRL that a 50 watt power limit is appropriate; and, we are adopting our proposed power limit of 50 watts PEP for amateur operations in the 219-220 MHz band. We also concur with ARRL that, given the interference avoidance requirements in this band, only amateur Technician or higher class licensees should be permitted to operate amateur stations in this band. Given the interference concerns associated with use of this band, we are not permitting Novice class amateur operations since they typically lack the experience of higher class amateur licensees.

21. With regard to channelization, we find that 100 kilohertz channels are appropriate for amateur fixed point-to-point digital communications at 219-220 MHz. This allocation is intended primarily for wideband operations, and the 100 kilohertz channels are appropriate for this purpose. Further, channelizing the band should help limit the potential for interference and ensure that the spectrum is used efficiently. We agree, however, with those commenters that suggest a maximum data rate requirement is unnecessary in this band; and, we are not adopting such a limit.

#### Coordination of Amateur Services.

22. In the *Notice*, we discussed recommendations from ARRL and Watercom that we include a coordination requirement as part of our plan for regulating interference from amateur operations. However, we concluded that a requirement for mandatory coordination of amateur service licensees by a non-government entity generally is not permissible under the Communications Act of 1934, as amended (the Communications Act).<sup>38</sup> We recommended, however, that the local volunteer amateur coordinators that already address operations in the 222-225 MHz band coordinate amateur secondary operations in the 219-220 MHz band. We stated that local amateur coordinators are qualified to handle any coordination task that may be necessary because the same coordination principles, based upon radiated power, distance, and type of signal modulation that are applicable to coordinating amateur operations are applicable to coordinating amateur operations with non-amateur operations.

23. We also proposed to require licensees of amateur stations to notify the appropriate AMTS licensee of any operation in the 219-220 MHz band within 240 km (150 miles) of an AMTS station and to obtain written approval from the appropriate AMTS licensee before operating any amateur station within 80 km (50 miles) of an AMTS station. We also proposed to require that these actions occur at least fourteen days prior to initiation of the amateur operation. In addition, amateurs would be required to resolve immediately any complaint of interference to an AMTS station that might arise or, alternatively, to cease operation of the transmitter causing that interference. Finally, we proposed to amend the rules to provide that no amateur in the 219-220 MHz band may cause interference to, nor is protected from interference due to operation of primary services in or adjacent to the band.<sup>39</sup>

24. *Comments.* UTC, in its comments, argues that the Commission's interpretation of the Communications Act is incorrect and a non-government entity could coordinate amateur operations at 219-220 MHz. Specifically, UTC contends that Section 332 of the Communications Act does not limit the Commission's authority to utilize a non-government coordinator for amateur operations. UTC argues that local coordinators will not be able to prevent interference

<sup>29</sup> Cheponis Comments at 2.

<sup>30</sup> Orion Comments at 4-7.

<sup>31</sup> VERA Comments at 5.

<sup>32</sup> ARRL Comments at 6.

<sup>33</sup> VERA Comments at 7-8.

<sup>34</sup> Gould Comments at 1.

<sup>35</sup> Watercom Reply at 1.

<sup>36</sup> Power spectral density is the amount of power per unit of spectrum in an electromagnetic field.

<sup>37</sup> Determining the D/U ratio is further complicated by an amateur's freedom in the equipment it utilizes and its freedom to adjust power.

<sup>38</sup> See Communications Act of 1934, as amended, 47 U.S.C. Section 332. Section 332 explicitly authorizes coordination of private land mobile and fixed services by parties who are not employees of the Federal Government. There is no provision for similar coordination arrangements with regard to the amateur service.

<sup>39</sup> See *Notice*, proposed rule Section 97.303(r), at Appendix A.

problems and recommends that a national entity coordinate amateur operations. Alternatively, UTC asserts that the Commission should at least require that all amateurs notify a single entity of all operations, thus providing a single point of contact to enable land mobile operations to investigate interference.<sup>40</sup>

25. Watercom, OPEN, ORRC, ARRL, and others contend that local coordinators are experienced and able to provide coordination services for amateurs in the 219-220 MHz band. Watercom, OPEN, ORRC, ARRL, and others also request that all amateurs be required to notify ARRL of their operations and that ARRL keep a database of all 219-220 MHz operations to aid local coordinators in their task, and that ARRL provide other services in investigating interference. ARRL states that amateurs notifying the ARRL of operations at 219-220 MHz is an essential ingredient in the process of preventing interference problems and maintaining an accurate database of operations. ARRL, OPEN, ORRC, the Portland Amateur Radio Club (PARC) and the Technology Radio Amateur Club (TRAC) assert that ARRL's "800 number" bulletin board system is ideal for a local frequency coordinator's use and has built in mechanisms to protect proprietary coordination information.<sup>41</sup> VERA requests that the Commission establish a procedure for amateurs to identify AMTS station licenses and to make such information available to coordinators and ARRL.<sup>42</sup>

26. In its comments, ARRL states that the proposed notification requirements are reasonable. It also submits that AMTS licensees would be more comfortable with a 640 km (approximately 400 mile) notification requirement, because tropospheric ducting could occasionally cause signals to propagate substantially farther than usual.<sup>43</sup> ARRL states that this additional notification requirement would not be burdensome. ARRL also states that the 80 km requirement for seeking written approval from AMTS facilities is adequate to protect AMTS stations from interference.<sup>44</sup> Watercom agrees.<sup>45</sup> ARRL and Watercom additionally recommend that we adopt a two-step notification procedure whereby notification by an amateur to an appropriate AMTS licensee would occur no less than thirty days prior to initiation of amateur operations, and again seven days prior to initiation of operations. Orion and Paging Systems argue, however, that for AMTS operations to achieve a sufficiently high D/U ratio over amateur operations, no amateur operations should be allowed to operate within 925 km (575 miles) of an AMTS operation without the consent of the AMTS operator.<sup>46</sup> ARRL states in its reply comments that Orion's 575 mile prohibition of ama-

teur operation without AMTS consent is technically flawed and that a worst case analysis yields a separation distance of less than 92 km.<sup>47</sup>

27. Mitchell and VERA argue that private service operators should not be given veto power over amateur operations. VERA contends that AMTS operators may not be technically qualified to determine the likelihood of interference from amateur operations and may refuse permission out of indifference or prejudice. VERA recommends that amateurs within 80 km of AMTS stations be allowed to perform demonstration tests for a sixty day period to test for interference.

28. Finally, regarding the protection of operations with a primary allocation in and adjacent to the 219-220 MHz band, ARRL argues that the proposed rule stating that amateur 219-220 MHz operations cannot interfere with primary operations should not apply insofar as it refers to television, land mobile or IVDS systems operating on adjacent frequencies. ARRL argues that requiring amateur operations to not interfere with primary services outside the 219-220 MHz band would require that amateurs be responsible for correcting interference resulting from design deficiencies in television or IVDS receivers, which is a matter over which amateurs have no control.<sup>48</sup> Additionally, ARRL argues that amateurs should not be responsible for protecting land mobile operations because they are in an adjacent band. ARRL argues that an amateur's responsibility should be limited to the spectrum purity standards in Section 97.307.1<sup>49</sup> However, UTC argues that without adequate safeguards and coordination, amateur operations could cause interference to private land mobile operations at 220-222 MHz. MSTV supports our rule protecting adjacent primary operations, arguing that it is necessary to ensure that the proposed amateur operations do not interfere with reception of television broadcasting.<sup>50</sup>

29. *Decision.* We agree with UTC that the Communications Act now permits us to designate a non-government entity to act as a coordinator for amateur services at 219-220 MHz. Subsequent to the *Notice*, the Omnibus Budget Reconciliation Act of 1993 amended Section 332 of the Communications Act, thereby permitting the Commission to designate a non-government entity as national coordinator for services such as the amateur service at 219-220 MHz.<sup>51</sup> Nevertheless, we do not believe that such an approach is the best solution in this case. We do not believe that a national coordinator is necessary. We agree with the majority of commenting parties that local amateur coordinators are best qualified to coordinate the amateur services at 219-220 MHz. At the same time, we agree that there should be a single national contact point to maintain a database of amateur operations in the 219-220 MHz band

<sup>40</sup> UTC Comments at 4-6.

<sup>41</sup> ARRL Reply at 4; OPEN Comments at 3; ORRC Comments at 4; PARC Comments at 4; and TRAC Comments at 4.

<sup>42</sup> VERA Comments at 7.

<sup>43</sup> Tropospheric ducting is a phenomenon in which a signal in certain frequency ranges and under certain conditions, is confined within the troposphere and propagates with much lower attenuation than would be obtained in a homogeneous atmosphere. Under these conditions, the signal can travel further.

<sup>44</sup> ARRL Comments at 9.

<sup>45</sup> Watercom Comments at 4.

<sup>46</sup> Orion Comments at 6-7 and Paging Systems Reply at 3.

<sup>47</sup> ARRL Reply at 7-8. ARRL's petition states that in a typical case where 12 dB of signal discrimination, provided by direc-

tional antennas and cross polarization, is available, amateur transmitters can operate on the same frequencies as AMTS receivers with a separation distance less than 50 km (31 miles). ARRL Petition at 24.

<sup>48</sup> ARRL Comments at 7.

<sup>49</sup> Section 97.307 sets forth emission standards for amateur operations to ensure that the operations are in accordance with good engineering practice. See 47 C.F.R. § 97.307.

<sup>50</sup> MSTV Reply at 1.

<sup>51</sup> See Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, 107 Stat. 312.

and provide this information to entities investigating interference. We believe a single database of all amateur operations in this band is crucial to successful sharing of the band. The ARRL has volunteered to serve as this point of contact, and we believe it is an appropriate choice. Accordingly, we will require that all amateurs notify the ARRL of operations in the 219-220 MHz band thirty days prior to initiation of operations. We are specifying in our rules that ARRL maintain a database of these operations and provide the information, upon request, to local amateur coordinators, primary service licensees, and other appropriate entities. We also encourage local amateur coordinators to provide coordination services or assistance to amateurs planning to utilize the 219-220 MHz band.<sup>52</sup> Finally, we concur with VERA that there should be a method for amateurs to find the location of the AMTS stations and encourage ARRL to also provide the AMTS information to amateurs.<sup>53</sup>

30. With regard to coordination and notification distances, we agree with ARRL and Watercom that possibilities for tropospheric ducting make it prudent to specify a longer notification distance, since the occurrence and severity of tropospheric ducting is substantially increased when a signal travels over or near water, especially large bodies of water. In the interest of maintaining simple but effective regulations, we will require amateur operators in the 219-220 MHz band to notify AMTS licensees of any operation within a 640 km (approximately 400 miles) radius. We believe that this requirement will not significantly burden amateurs and will assist AMTS licensees more easily to identify the source of any interference if, in the unlikely event, such interference occurs. We believe that Orion's and Paging Systems' proposed notification distance of 575 miles is excessive and unnecessary. We note that Orion and Paging Systems have not provided any studies to support such a requirement, while technical studies in the record indicate that less separation will prevent interference under all but rare propagation circumstances.

31. As suggested in the *Notice*, we will also require amateurs to obtain written approval from the appropriate AMTS licensee before operating within 80 km (50 miles) of an AMTS station.<sup>54</sup> Further, amateurs will be required to resolve immediately any complaint of interference to an AMTS station or, alternatively, to cease operation. Regarding VERA's suggestion that amateurs planning to establish 219-220 MHz operations within 80 km of an AMTS station be permitted to perform demonstration tests for a sixty day period to test for interference, we believe this is a good idea, but does not necessitate a rule. Our analysis of this band indicates that amateur operations within 80 km of AMTS stations have a potential to cause interference. However, we believe that amateurs can design their system to employ interference avoidance techniques to permit sharing with less distance separation, but the cooperation of the AMTS licensees must be obtained. We will not mandate that AMTS licensees must allow amateur 219-220 MHz

stations to operate within 80 km for interference concerns. We encourage licensees of both services to cooperate and promote a successful spectrum sharing situation. Accordingly, all amateur operations in the 219-220 MHz band must notify AMTS operations, within 640 km radius, thirty days prior to initiation of operations and no amateur station may operate in the 219-220 MHz band within 80 km radius of an AMTS station without written approval from the appropriate AMTS licensee.

32. Finally, regarding protection of adjacent channel primary services, we believe that our current rules, the new rules we are adopting herein, and the competence of the amateurs using this band should be sufficient to protect adjacent channel operations. We do not agree with ARRL's opposition to our rule protecting primary operations in and adjacent to the 219-220 MHz band from amateur operations. Television and IVDS operations have a primary allocation and therefore are afforded protection from secondary operations. We do recognize that receiver selectivity and intermodulation distortion characteristics are matters of design, and expect receivers to be designed consistent with good engineering practice. Additionally, our rules require that stations of a service shall use frequencies sufficiently separated from the limits of a band allocated to that service so as not to cause harmful interference to services in immediately adjoining frequency bands.<sup>55</sup> Accordingly, amateur operations in the 219-220 MHz band are not permitted to interfere with, nor are protected from interference by, primary service operations in and adjacent to the 219-220 MHz band.

## V. PROCEDURAL INFORMATION

33. *Regulatory Flexibility Analysis.* The analysis pursuant to the Regulatory Flexibility Act of 1980, 5 U.S.C. Section 608, is contained in Appendix B.

34. *Ordering Clauses.* IT IS ORDERED, that the American Radio Relay League, Inc. is designated as the national contact point for all amateur operations in the 219-220 MHz band and is responsible for maintaining a database of all amateur operations in the 219-220 MHz band.

35. Further, IT IS ORDERED, that Parts 2, 80, and 97 of the Commission's rules ARE AMENDED as specified in Appendix A, effective 30 days after publication in the Federal Register. This action is taken pursuant to Sections 4(i), 7(a), 302, 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 157(a), 302, 303(c), 303(f), 303(g), and 303(r).

<sup>52</sup> We note that business radio services, radiolocation operations, and wildlife telemetry operations also use the 216-220 MHz band. Amateurs contemplating operations in the 219-220 MHz range would need to consider all such operations when performing interference studies and implementing their systems.

<sup>53</sup> This information is on the Commission's database which can be accessed through a contractor, Interactive Systems, Inc. at (703) 812-8270.

<sup>54</sup> Amateurs could identify AMTS stations either through contacting the AMTS licensee(s) in the areas in which they plan to operate, through contacting ARRL, or through the Commission's database of AMTS stations.

<sup>55</sup> See 47 C.F.R. §§ 2.102(f), 97.307(e).

## FEDERAL COMMUNICATIONS COMMISSION

William F. Caton  
Acting Secretary

**Appendix A: Final Rules**

Parts 2, 80, and 97 of chapter I of title 47 of the Code of Federal Regulation are amended as follows:

**PART 2--FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS**

1. The authority citation in Part 2 continues to read:

**AUTHORITY:** Sec. 4, 302, 303, and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154, 302, 303, and 307, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended as follows:

a. In the 216-220 MHz band, revise columns 4-6 to read as follows:

## § 2.106 Table of Frequency Allocations

\*\*\*\*\*

International table		United States table		FCC use designators	
Region 1-allocation MHz	Region 2-allocation MHz	Government Allocation MHz	Non-Government Allocation MHz	Rule Part(s)	Special-use frequencies
(1)	(2)	(4)	(5)	(6)	(7)
*****	(3)	216-220 MARITIME MOBILE. Aeronautical-Mobile. Fixed. Land Mobile. Radiolocation.	216-220 MARITIME MOBILE. Aeronautical-Mobile. Fixed. Land Mobile.	MARITIME (80). Private Land Mobile (90). Personal Radio Service (95). Amateur (97).	
		627, US210, US229, US274, US317, G2.	627, US210, US229 US274, US317, NG152.		

\*\*\*\*\*



b. The text of footnote NG152 in the Non-Government footnotes is added to read as follows:

**Non-Government (NG) Footnotes**

\* \* \* \*

NG152 The band 219-220 MHz is also allocated to the amateur service on a secondary basis for stations participating, as forwarding stations, in point-to-point fixed digital message forwarding systems, including intercity packet backbone networks.

\* \* \* \*

**PART 80--STATIONS IN THE MARITIME SERVICES**

1. The authority citation for Part 80 continues to read as follows:

**AUTHORITY:** Sec. 4, 303, 48 Stat. 1066, 1082, as amended; 47 U.S.C. 154, 303, unless otherwise noted. Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. 151-155, 301-609; 3 UST 3450, 3 UST 4726, 12 UST 2377.

2. Section 80.385 is amended by adding a new paragraph (a)(3) to read as follows:

**§ 80.385 Frequencies for automated systems.**

\* \* \* \*

(a)(3) Channels in the 219-220 MHz band are also used on a secondary, non-interference basis by amateur stations participating in digital message forwarding systems. Amateur stations may not cause harmful interference to AMTS operations and must accept any harmful interference from AMTS operation. Amateur stations within 80 km (50 miles) of an AMTS coast station must obtain written approval from the AMTS licensee prior to operating in the 219-220 MHz band. Amateur stations within 640 km (398 miles) of an AMTS coast station must notify the AMTS licensee in writing at least 30 days prior to initiation of operations in the 219-220 MHz band. All amateur stations must notify the American Radio Relay League in writing at least 30 days prior to initiation of operations in the 219-220 MHz band (ARRL, 225 Main St., Newington, CT 06111-1494).

\* \* \* \*

**PART 97--AMATEUR RADIO SERVICE**

1. The authority citation for Part 97 continues to read as follows:

**AUTHORITY:** 48 Stat. 1066, 1082, as amended; 47 U.S.C. 154, 303. Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. 151-155, 301-609, unless otherwise noted.

2. Section 97.201(b) is revised to read as follows:

**§ 97.201 Auxiliary station.**

\* \* \* \* \*

(b) An auxiliary station may transmit only on the 1.25 m and shorter wavelength bands, except the 219-220 MHz, 222.000-222.150 MHz, 431-433 MHz, and 435-438 MHz segments.

\* \* \* \* \*

3. Section 97.301(a) is revised by changing the third entry in the VHF Wavelength band to read as follows:

**§ 97.301 Authorized frequency bands.**

\* \* \* \* \*

(a) \* \* \* \* \*

Wavelength band	ITU-Region 1	ITU-Region 2	ITU-Region 3	Sharing requirements see § 97.303 (Paragraph)
VHF	MHz	MHz	MHz	

\* \* \* \* \*

1.25 m .....	.....	219-220.....	.....	(a), (e)
-Do-.....	.....	222-225.....	.....	(a)

\* \* \* \* \*

4. Section 97.303(e) is added to read as follows:

**§ 97.303 Frequency sharing requirements.**

\* \* \* \* \*

(e) In the 1.25 m band:

(1) Use of the 219-220 MHz segment is limited to amateur stations participating, as forwarding stations, in point-to-point fixed digital message forwarding systems, including intercity packet backbone networks. It is not available for other purposes.

(2) No amateur station transmitting in the 219-220 MHz segment shall cause harmful interference to, nor is protected from interference due to operation of Automated Maritime Telecommunications Systems (AMTS), television broadcasting on channels 11 and 13, Interactive Video and Data Service systems, Land Mobile Services systems, or any other service having a primary allocation in or adjacent to the band.

(3) No amateur station may transmit in the 219-220 MHz segment unless the licensee has given written notification of the station's specific geographic location for such transmissions in order to be incorporated into a data base that has been made available to the public. The notification must be given at least 30 days prior to making such transmissions. The notification must be given to:

*The American Radio Relay, Inc.*  
*225 Main Street*  
*Newington, CT 06111-1494*

(4) No amateur station may transmit in the 219-220 MHz segment from a location that is within 640 km of an AMTS Coast Station unless the amateur station licensee has given written notification of the station's specific geographic location for such transmissions to the AMTS licensee. The notification must be given at least 30 days prior to making such transmissions. AMTS Coast Station locations may be obtained either from:

*The American Radio Relay, Inc.*  
*225 Main Street*  
*Newington, CT 06111-1494*

or

*Interactive Systems, Inc.*  
*Suite 1103*  
*1601 North Kent Street*  
*Arlington, VA 22209*  
*Fax: (703) 812-8275*  
*Phone (703) 812-8270*

(5) No amateur station may transmit in the 219-220 MHz segment from a location that is within 80 km of an AMTS Coast Station unless the amateur station licensee holds written approval from that AMTS licensee.

\* \* \* \* \*

5. The table in Section 97.305(c) is revised by changing the third entry in the VHF wavelength band to read as follows:

**§ 97.305 Authorized emission types.**

\* \* \* \* \*

Wavelength band	Frequencies	Emission types authorized	Standards see § 97.307(f), paragraph:
-----------------	-------------	---------------------------	---------------------------------------

\* \* \* \* \*

1.25 m -Do-	219-220 MHz 222-225 MHz	Data..... MCW, phone, image, RTTY, data, test...	(13) (2), (6), (8)
----------------	----------------------------	--	-----------------------

\* \* \* \* \*

6. Section 97.307(f)(13) is added to read as follows:

**§ 97.307 Emission standards.**

\* \* \* \* \*

(f) \* \* \* \* \*

(13) A data emission using an unspecified digital code under the limitations listed in § 97.309(b) of this Part also may be transmitted. The authorized bandwidth is 100 kHz.

7. Section 97.313(h) is added to read as follows:

**§ 97.313 Transmitter power standards.**

\* \* \* \* \*

(h) No station may transmit with a transmitter power exceeding 50 W PEP on the 219-220 MHz segment of the 1.25 m band.

**APPENDIX B: FINAL REGULATORY  
FLEXIBILITY ANALYSIS**

Pursuant to 5 U.S.C. Section 603, an initial Regulatory Flexibility Analysis was incorporated in the *Notice of Proposed Rule Making* in ET Docket 93-40. Written comments on the proposals in the *Notice*, including the Regulatory Flexibility Analysis, were requested.

*A. Need for and Objective of Rules:* Our objective is to provide a secondary allocation for the amateur service which will permit amateur service operators to establish point-to-point fixed digital message forwarding systems without interfering with primary services. We believe that the rules are sufficient to permit amateurs to share the spectrum, while the flexibility of the rules will in large part provide amateurs with the operational freedom to which they are accustomed.

*B. Issues Raised by the Public in Response to the Initial Analysis:* No party suggested modifications specifically to the initial regulatory flexibility analysis.

*C. Any Significant Alternative Minimizing Impact on Small Entities and Consistent with Stated Objectives:* This proposal may provide new marketing opportunities for amateur radio equipment manufacturers, some of which may be small businesses.

**APPENDIX C: COMMENTING PARTIES****Comments to the ARRL NPRM for the 219-220 MHz band.  
(ET Docket 93-40, RM-7747)**

1. March 19, 1993 Palm Beach Packet Group, Inc.
2. May 4, 1993 Gary R. Mitchell
3. June 14, 1993 George DuBois, N7RYS
4. June 14, 1993 Authorized counsel or Executive Agent of the National Communications System (NCS)
5. June 14, 1993 The Oregon Region Relay Council
6. June 14, 1993 The Oregon Packet Experimenters Network
7. June 14, 1993 The Portland Amateur Radio Club
8. June 14, 1993 The Technology Radio Amateur Club
9. June 15, 1993 American Radio Relay League, Incorporated
10. June 15, 1993 Mike Cheponis, K3MC
11. June 15, 1993 Fred W. Daniel d/b/a Orion Telecom
12. June 15, 1993 Roy E. Gould, N5RG
13. June 15, 1993 Dewayne Hendricks, WA8DZP
14. June 15, 1993 ProNet, Inc.
15. June 15, 1993 Utilities Telecommunications Council
16. June 15, 1993 Waterway Communications System, Inc.
17. June 16, 1993 Lee Sutherland Parr
18. June 16, 1993 The Valley Emergency Radio Association (VERA)

**Reply Comments to the 219-220 MHz Amateur NPRM.**

1. July 15, 1993 American Radio Relay League, Incorporated
2. July 15, 1993 The Associated Public-Safety Communications Officers, Inc. (APCO)
3. July 15, 1993 Paging Systems, Inc.
4. July 15, 1993 Waterway Communications System, Inc.
5. July 23, 1993 Late Filed by Association for Maximum Service Television, Inc. (MSTV)